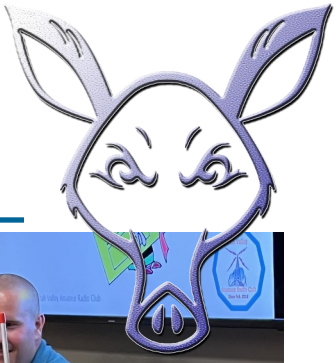
Issue 50

June 2023

Utah Valley Amateur Radio Club

The UVARC Shack

Engaging the youth



Assisted by Zach Johnson KK7KPG, Brent Gray KE7SAO dishes out the grand prize at our May meeting to Ashley Hales, daughter of Heath Hales KG7JYU. With a recently huge influx of younger hams, we not only have accepted a big responsibility, but also face new challenges of seeking creative ways of helping these intelligent kids find relevance and retention in the amateur community, even during Field Day.

We've had at least three members, Shawn Hatfield KJ7SNE, Gavin Grow K9GKG, and Jeff Mortensen KG7WIJ, all schoolteachers, share their amateur radio excitement in the classroom and involve their students.

Brent, the self-proclaiming *youngest resident of the 55-plus community* is one of many recent members of a generation of curious hams who will one day take the baton and carry on as leaders in the brave, new amateur radio world.

In this issue of the *UVARC Shack*

Club meetings feature UCARES and the joy of working QRP.

Silent Key for W1YMI. *My Shack* spotlights KE7UIA. *Amateurs in Action* in New Hampshire. *Brass Tacks* on op amps.

Dear Annette on running coax in ductwork and how an SWR can protect your transceiver. *Hot Tips* for routing coax. *DIY* for a weird 2-meter antenna, the *Hentenna*. *The Amateur in You* on ham radio for enquiring minds, even those who ask for the impossible.

Please send your ideas, stories, questions, gripes, and photos to ***uvarcshack@gmail.com***

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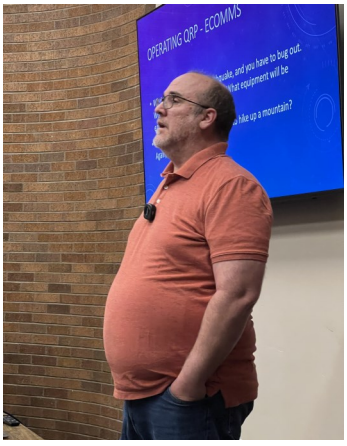
Club meetings

Recap

April 2023 club meeting – Amateur Radio Emergency Service

Caryn Alarcon KG7UUR, Gavin Grow K9GKG, Keith McQueen KB7M, and Andrew Barney W7IE tag-teamed a great presentation on the purposes and functions of UCARES, the *Utah County Amateur Radio Emergency Service*. We had to move our meeting to the Lindon City Center, and so missed some members who were looking forward to meeting with us that month.

May 2023 club meeting – The Joy of QRP



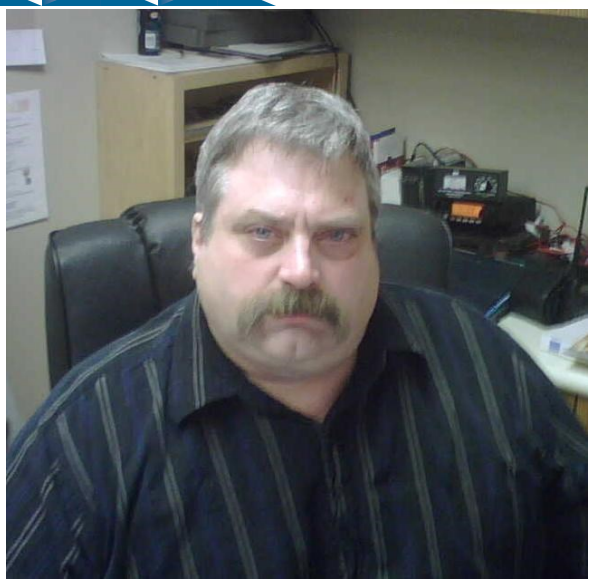
Many of us have looked forward to learning more about QRP, which is short for *low-power operation*. Ralph Nunn K7RLN led us through a great presentation on QRP, what that means, how to work it, and the equipment needed to operate it. Also, due to a scheduling conflict, we had to squeeze 63 people into a maximum 54-person room! At the end of the meeting, Caryn Alarcon KG7UUR gave a brief memorial for Reid Dickson W1YMI, who recent became silent key. You can see a recording of the meeting on this link, thanks to Trevor Holyoak AG7GX.

By the way, many of our past meetings are recorded and posted on the club YouTube channel.

Silent Key

Memorial for a ham who has passed on

Reid Dickson, W1YMI



A gentle giant and friend Reid Dickson W1YMI, has moved on from this existence, but left behind a great legacy.

A ham and UCARES (Utah County Amateur Radio Emergency Service) member, Reid mentored numerous new operators in the first footsteps on their journey through service. He helped many navigate their way through the certification levels, Field Days, and SETs (simulated emergency trainings) by both patient coaching and example. Reid was eventually appointed EC (Emergency Coordinator) for the SCAteam (Sheriff's Communication Auxiliary team) over Utah County.

As a club member, Reid attended many club meetings, as often as he could when his health permitted. During the week, he often checked in with the club's Wednesday night HF Nets.

Here are some paraphrased excerpts from his obituary:

Reid served a mission for the Church of Jesus Christ of Latter-day Saints in Tampa, Florida. Soon afterwards, he met the love of his life, Brenda, and the two were sealed in the Idaho Falls temple. He graduated from Utah Valley State College (now UVU) in drafting and design.

Reid has always shown kindness, friendliness, and a willingness to help others. Even though he was somewhat walker-bound the last couple of years, he was still willing to help teach a skill to a fellow operator, or help other hams understand some of the mysteries and magic of radio. His infectious smile often hid the trials we was going through with his health, and had a way of letting you know that all is good.

At Callie's Café, 07 Feb 2019

Reid, you will be sorely missed by many.

73, good friend.

My Shack

Highlighting the shack (ham equipment and room) of a member, to give others an idea of the possibilities that might work for them

Gary Hutton, KE7UIA

At the young age of 15, Gary had a junior high teacher who demonstrated ham radio in class, and suddenly, he was interested. But the Morse code requirement caused him to shy away from the hobby at that time. Fast-forward to 2008. Close friend and ward member Alan Rasmussen AJ9R invited Gary to an emergency communication Fair, and the interest was reborn.

Gary took the Technician exam and easily passed. Soon afterwards, Gary took Noji's General course, and passed the General exam. *Someday, I'd really like to become the digital expert, and start a fldigi net and maybe even a VARA FM net.*

Being very involved with UCARES (Utah County Amateur Radio Emergency Service), Gary is now part of the ECS (Emergency Communications and Support) team, formerly the Sheriff's Communication Auxiliary. He loves running their nets and the various assignments he's had with them, including being the liaison to the American Fork Hospital. Recently, Gary has been asked to assist Vineyard in getting their EOC (emergency operations center) off the ground.

Gary is quite devoted to his wife, and makes sure she knows that she's the priority in his life. So, involved with amateur radio as he is, he makes sure that his activities (and antennas) meet his wife's approval, and largely they do.

My equipment includes:

Icom IC-7000 HF transceiver
Yaesu FT-60R dual-band handheld transceiver
Baofeng dual-band handheld transceiver
Yaesu FT-2800 2-meter mobile transceiver
Yaesu FT-8900R dual-band mobile transceiver
Yaesu FT-8800R dual-band mobile transceiver
Pockrus VHF/UHF J-pole antenna
Homebrewed VHF/UHF colinear J-pole vertical antenna
MyAntennas 8010 end-fed half-wave HF antenna

Gary currently serves as the UCARES AEC (Assistant Emergency Coordinator) Net Manager.

— 73, Gary

Amateurs in Action

Recounts of ham radio operators who have used their effort and skills to help others in a time of need

New Hampshire mountain rescue

On 04 December 2022, Nick Lang KC1OTX of Plaistow and his friend Ben were driving around Pittsburgh, in northern New Hampshire, a place they'd been many times. *When we got there, the conditions were snowy, but not icy.* Nick is an emergency response volunteer and a licensed ham. Once out on a remote road, however, the roads became very slick. *As soon as the traction control kicked on, that's when I decided it was time to turn around. And when I turned around is when everything kinda went wrong*, Nick said, *we spun three complete times*.

Ben, left, and Nick Lang KC1OTX

Hanging over an embankment, Nick couldn't open his door. Ben got out and secured the car with ropes so it wouldn't slide further. *He was cranking on the rope when the hook snapped and...smashed into his kneecap.* There they were, Ben was injured, the vehicle was stuck, and no cell service. Nick climbed to higher ground with his AnyTone HT ham radio and called for help on the nearest known repeater, about 60 miles away on Mt. Washington (he thought they were only 30 miles away).

Derek Flint KC1QXL

Derek Flint KC1QXL had his radio on, monitoring the Mt. Washington repeater, when he heard the call for help from his Vermont home, some 54 miles from the repeater. *This is KC1QXL. I'm here. There's still no audio.* Derek is visually impaired, and is a new ham by only a few months. Yet, now he was thrown into a radio-driven rescue. *I heard something, but I couldn't quite copy.*

It was obvious that the stranded motorists could hear Derek, but that Derek had a very difficult time hearing them. So, Derek said he's going to ask some questions, and they should answer with one kerchunk for Yes and nothing for No. With that, Derek began gathering information about their location and their welfare.

Roger Marcoux K1DFA

Another ham, Roger Marcoux K1DFA was listening to the same repeater from his home in Bartlett, New Hampshire, and jumped on to help. Roger was trying to determine where the stranded travelers were, by listening for clues from the difficult transmissions and the kerchunks. Once he could make out the location, Roger called 911, and help was on the way.

After more than three hours, they finally heard reports of the rescue crew arriving at the slide-off site. *Thank you. Thank you for saving my life today.* Nick said he was really glad that he packed his radio at the last minute before leaving on their trip.

You can read more about their adventure on the WMUR page and see a video of it on YouTube.

New Hams and Upgrades

New hams

KK7LTW = Tyler Nielsen
KK7LTY = Tyler Allan
KK7LUH = Warren Spencer
KK7LUO = Briana Mortensen
KK7LZR = Greg Ricks
KK7MAF = Christopher Linton
KK7MDY = Sarah Mitchell
KK7MEB = James Nistler
KK7MEC = Sterling Petersen
KK7MED = James Tilley
KK7MEF = Dylan Wolkins
KK7MFA = Corban Billings
KK7MFB = Hazen Hutchinson
KK7MFP = Jennifer Chavez
KK7MFQ = Saul Chavez
KK7MFR = Trot Dicou
KK7MGE = Karrie Pflegl
KK7MGW = Jerhemy Shepherd
KK7MGX = Paula Shepherd
KK7MHG = Deann Pflegl
KK7MJX = Matthew Ocon
KK7MMS = Krista Swanson
KK7MNJ = Shane Hathaway
KK7MNK = James Olsen
KK7MNL = Jason Stapleton
KK7MNM = Jaxon Valerio
KK7MNN = Nickie Valerio
KK7MQB = Ryan Coatney
KK7MQM = Marcus Blanchard
KK7MRG = Joel Stucki
KK7MRJ = Daniel Rosengren
KK7MTG = Gregory Watts
KK7MXE = Vicky Thompson

Upgraded hams

N7DSL = Dan LaPray (General)
K7RJH = Joe Heagany (General)
KC7ZSO = Marcelo Paz (General)
KK7LAE = Clarence Whetten (General)
KK7KPU = Corey McCabe (General)
KK7KOT = Rob James (General)
K7BOM = Tim Julian (General and Extra)
KD2FIM = Spencer Sonnefeld (General)
KK7LDD = Teancum Clark (General)
KD7APX = Mark Bartlett (General)
KD7ZSL = James Hyde (General)
KI7REM = Justin Hansen (General)
KJ7EJO = Gordon Orr (General)
K7THW = Thomas Williams (General)

Congratulations to all these diligent folks! We look forward to hearing you on the radio soon.

Events

Upcoming happenings

Summer Field Day

As is our tradition, UVARC will be participating in Field Day Saturday June 24 through Sunday June 25. Our location this year will be at the same place as last year, up Trout Creek, about a quarter of a mile north off Highway 40, at an open location. Our Field Day Potluck will be a taco bar that Saturday afternoon the 24th, and a sign-up sheet will be posted.

We'll need help from generous club members, to provide two RVs, in which we can establish our stations, and nearby antennas. And of course, we'll need help taking it all down Sunday at noon too. We also need three volunteers with the ability to tow the communication trailer, the club trailer, and the port-a-potty trailer. More details as we get closer.

76ers Annual Barbecue

Lynn Hancock K7LSH and Carl Pockrus WE7OMG have once again secured the pavilion at Highland Glen Park for our annual barbecue, this year on Saturday July 8, from 10 am to 3 pm.

If all goes as planned, we'll have an HF station set up for you to get on the air, a door prize drawing, and maybe even a fox hunt. If you'd like to contribute toward the food or door prizes, please get hold of Carl or Jeremy K7TEH. The address is 4800 Knight Ave, Highland.

UVARC Ham Radio Fair

Our annual Ham Radio Fair, will be held 6:00 pm on Thursday July 13, in the large pavilion at Pheasant Brook Park, 400 N 800 W in Lindon. Families, friends, friends of your family, are welcome to check out the stuff, the stations, and the fun of amateur radio.

See how others set up an actual VHF or portable HF station, go-kit, and their antennas. Check out a solar solution, a digital station, how to program an HT, and what the possibilities are. And we'd love to have you volunteer your own setup or expertise!

UVARC 2023 Swap Meet

Heads up! The Utah Valley Swap Meet this year will be 9:00 am Saturday September 30, at the Spanish Fork North Park Pavilion, 1185 N 400 E. One of our few fund-raisers, entrance is $5 per person or $10 per family, plus $10 per half-table to display your wares. The fees are waived for outside clubs and service (ARES, RACES, CERT, etc.) groups who want to use our swap meet to promote their activities.

Dave Becar KI6OSS said that he plans to hold an exam session just outside the pavilion, under the Laurel VEC. We'll post that info as we get closer.

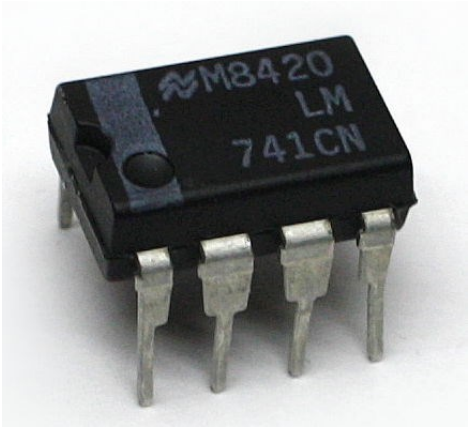
76ers Annual Ice Cream Social

It's time once again for the 76ers Annual Ice Cream Social, at Leatherby's in Orem, 304 E University Parkway. Bring your family on Saturday July 15 at 1:00 pm, and join us for lunch and treats. They have burgers, fries, and deli sandwiches, as well as world-class shakes.

Brass Tacks

An in-depth look at a radio-related topic

Operational amplifiers



In many of today's electronic devices and instruments, one of the simplest yet useful components is the operational amplifier, or ***op amp*** for short. It's an analog integrated circuit that does a lot with very little, yet many technicians and engineers alike struggle with just how these little wonders work. Building upon the miracle of the transistor, the op amp represents yet another up-ratchet level of circuit functionality after the basic logic gate. Actually, knowing how an op amp works is not all that important, unless you're attempting to improve upon it, but knowing how to use one is essential to complex analog circuit design.

The term *operational amplifier* should not be confused with a typical radio amplifier unit that you can purchase, plug in, and that can magically reproduce your transceiver's output signal at a higher wattage. Instead, an op amp is used as one of many building blocks in electronic instrumentation (oscilloscopes, signal generators, analyzers, meters), appliances (computers, routers, ham radios, TVs, inverters, controllers, and yes, amplifiers), and much more. In fact, it's no exaggeration to say that op amps can be found in nearly all modern electronic devices.

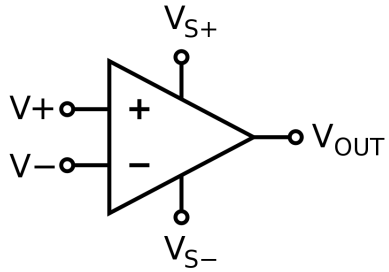
Conversations about op amps and the circuitry that use them can become quite deep in technical theory very quickly, so the goal in this discussion is to highlight its most basic and common properties and applications. To help keep this topic simple, let's focus on three common uses of op amps, that as an amplifier, an oscillator, and an active filter.

Terminology and pinout

Before getting into the details of common usage, let's agree on some terminology. Because an op amp is a *differential amplifier* (amplifies the difference between the two input signals), it has no inherent sense of a "ground" and is supplied by two voltages, often labeled $\mathbf{V_s+}$ and $\mathbf{V_s–}$, also known as the ***positive supply rail*** and ***negative supply rail***, respectively.

Amplification is the increase in some value (voltage, in the op amp case) of a particular signal. ***Gain*** (often labeled ***A*** or ***G***, depending on who describes it) is the measure of amplification, defined as the ratio of the output voltage to the input voltage. ***Saturation*** is the condition in which an amplifier can no longer increase the voltage past a maximum, defined by the supply rails and other properties.

The diagram to the right shows the basic "pinout" of a typical op amp; that is, the connections on the outside of the device and what they connect to internally. The $\mathbf{V_s+}$ and $\mathbf{V_s–}$ pins are the supply rails, as mentioned previously. The **V+** pin is the *non-inverting input voltage*, while the **V–** pin is the *inverting input voltage*. $\mathbf{V_{OUT}}$ is the single output of the op amp. (An op amp with a differential input and a differential output is called a *fully differential amplifier*, which is outside the scope of this discussion.)



Op amp symbol and pinout

Brass Tacks

continued

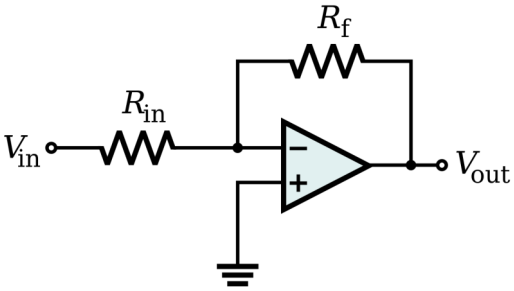
Closed-loop amplifier

If a connection is made between the op amp output and one of its inputs, we say that the op amp is operating in *closed-loop* mode; otherwise, it's operating in an *open-loop* fashion. Due to the enormous gain of an op amp, the open-loop amplifier is easily driven to saturation, and so is not often as useful as in the closed-loop mode, as will be shown later.

Perhaps the most common configuration in which an op amp is used in a circuit is known as ***negative feedback***, so-called because the circuit outside the op amp has provided the device with some electrical path from its output to its inverting (**V–**) input. In this mode, the op amp will attempt to do what's necessary electrically to bring the inverting (**V–**) and non-inverting (**V+**) voltages to very close to the same value. Since in this mode the measured voltage is common (the same) between the two, this is known as the *common mode*, and the two input voltages the input *common-mode voltage*. This is not to be confused with the common-mode that arises from an extra current flowing on the skin of a conductor, detailed in another discussion.

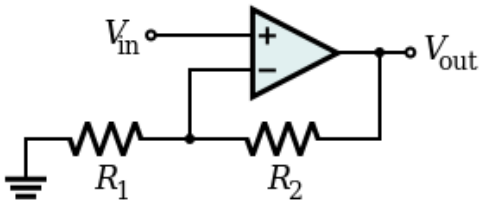
When examining a circuit or design that includes an op amp, one of the first things that should be determined is whether the op amp is configured for negative feedback. If negative feedback is used, several fairly reasonable assumptions can be made, which can greatly simplify op amp behavior calculations. Perhaps the most important of these assumptions is that the voltages of the **V+** and **V–** inputs are nearly the same, the minute difference between the two known as *input offset voltage*.

The two most useful op amp negative feedback circuits are those for an *inverting amplifier* and a *non-inverting amplifier*. The following is a schematic example of a inverting amplifier, and the accompanying voltage gain calculation, given the resistor values:



$$V_{out} = -\frac{R_f}{R_{in}} V_{in}$$

The following is an example of a non-inverting amplifier and its voltage gain calculation:



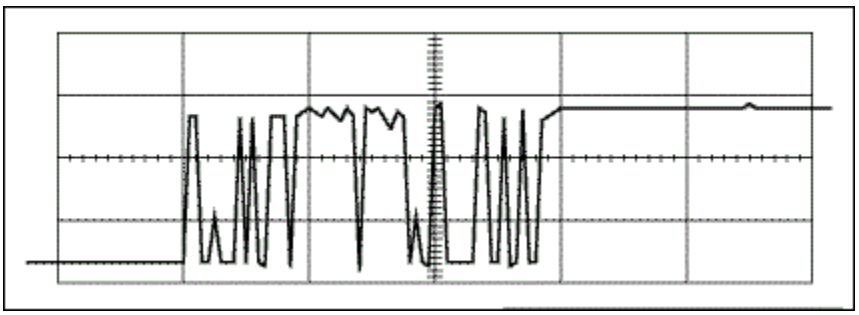
$$V_{out} = (1 + \frac{R_2}{R_1}) V_{in}$$

Brass Tacks

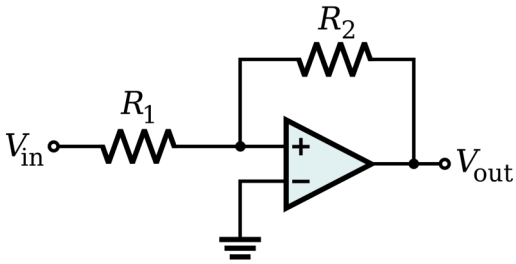
continued

An op amp circuit using ***positive feedback*** in its closed loop can be useful due to its high gain; that is, the output is at maximum (saturation) positive when the input is even a little positive, and at maximum negative when the input is even a little negative.

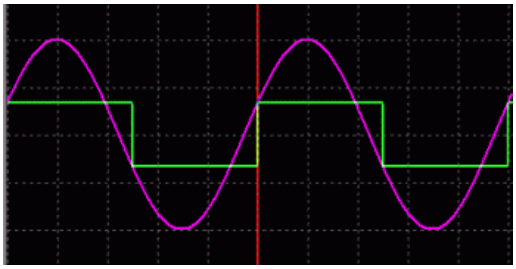
Take the example of a *switch de-bouncer*. When a physical switch closes, it doesn't simply make perfect contact once and is done; it "bounces" closed, meaning that it can make contact dozens of times before settling into its final closed position, which can wreak havoc on a circuit that might not tolerate multiple rapid openings-and-closings of the switch. Here's a graph showing an actual switch closing:



If this was the input to a digital circuit, then the switch has created an unwanted stream of false ones and zeroes (and a few unknown transitions) into the circuit, which can confuse it. (Opening the switch has the same result, of multiple openings and closings before settling.) A switch de-bouncer can be made from an op amp using positive feedback configured in a circuit known as a *Schmitt trigger*, which uses *hysteresis* to achieve its effect, and is shown here:



The Schmitt trigger using an op amp with positive feedback can also be useful for converting a sinusoid into a square wave, with the upper and lower voltage bounds (common-mode output voltage) establishing the "high" and "low" voltage levels required by digital circuits. The following oscilloscope display shows the sinusoidal input as purple and the digital output as green:



Brass Tacks

continued

The ideal op amp

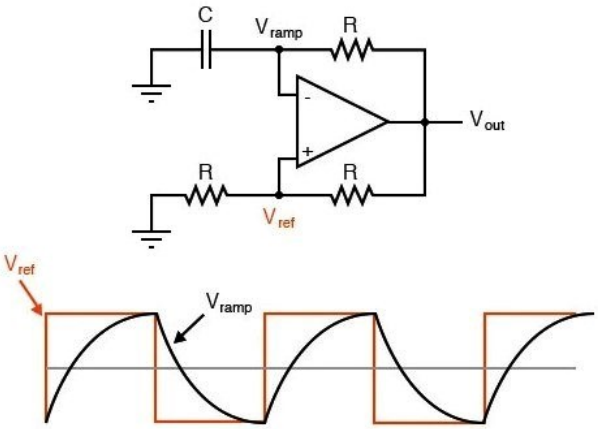
The concept of an ideal op am is important for analog engineering design work, because these assumptions not only simplify otherwise difficult calculations, but are also closely reflective of actual op amp behavior. Here are some useful ideal op amp properties:

- **Very high (infinite) input impedance**, and therefore zero input current
- **Very low (zero) output impedance**, and therefore an infinite output current range
- **Infinite gain**
- **Zero input offset voltage** (difference between the two input voltages)
- **Infinite slew rate** (*dV/dt*), a measure of how quickly the voltage can change
- Others, including infinite bandwidth, zero phase shift, and zero noise

Obviously, none of these can be perfectly realized physically, due to finite material properties and limited manufacturing processes, but often close is good enough. Where more precise engineering is required, equivalent (resistive, capacitive, inductive) properties can be used to supplement the ideal model.

The op amp as an oscillator

Using the RC time constant of the input capacitor and feedback resistor in the following circuit, the op amp can be made into an oscillator:



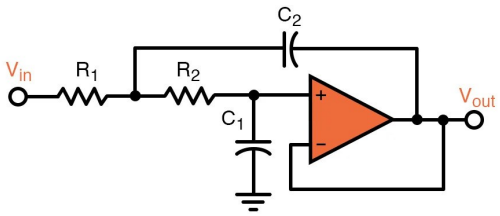
When the output is saturated positive, the V_{ref} point will be positive, and the capacitor will charge in the positive polarity. When V_{ramp} reaches and exceeds V_{ref} by the smallest amount, the output will then immediately saturate negative due to the high gain of the op amp, and the capacitor will charge in the negative polarity. Oscillation occurs because the positive feedback is nearly instantaneous, and the negative feedback is delayed by the RC time constant. The oscillation frequency can then be adjusted by varying the size of the capacitor and / or feedback resistor.

Brass Tacks

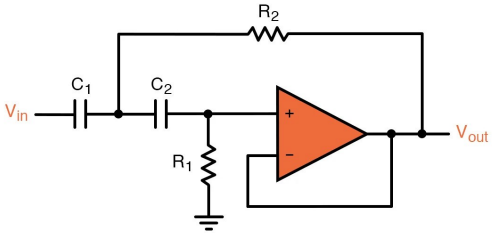
continued

The op amp as an active filter

In past articles, we've discussed general filtering and filters made from components, but those were primarily passive filters, ones made from passive components. It turns out that much of the filtering involved in amateur radio equipment is by *active filtering*, which often uses op amps as the core filtering control mechanism. The following two filters are examples of second-order active filters:



2nd order low-pass filter



2nd order high-pass filter

Finally

We've only discussed the simplest or most common op amp properties. Other important design considerations include, but are not limited to, gain bandwidth product, slew rate, and input noise voltage. Additionally, here are other useful op amp circuits that find uses in instrumentation and amateur radio equipment:

- comparator - open-loop (no signal being fed back to the input) configuration, in which the output is simply the difference between the two input signals, multiplied by the gain
- buffer (voltage follower) - changes circuit impedance without changing the voltage
- integrator - the output signal reflects the integral of the input
- differentiator - the output signal reflects the differential of the input
- exponential output - the output signal reflects the exponential of the input
- logarithmic output - the output signal reflects the logarithm of the input
- gyrator - can produce the effect of an inductor, using a capacitor and an op amp

Summary

The op amp (operational amplifier) is an integrated circuit electronic component that can be externally wired to provide a variety of useful functions. It can be found in most of today's electronics, and modern amateur radio could not implement many of its important features without them. By employing negative feedback, the op amp can be used as an amplifier with configurable gain. In many cases, calculations can be simplified under certain configurations if the op amp is assumed to be ideal. Other significant op amp uses include the oscillator and active filter.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Dear Annette

What's on your mind? Serious, humorous, technical, and thoughtful answers to your deepest, (mostly) ham-related questions.

Dear Annette:

I read the article in the last newsletter about how to get people interested in ham radio, and I've tried some of the things mentioned, with almost no success. Do you have any ideas about how to get people to start thinking about ham radio and preparedness?

Randy in Orem

Dear Randy:

On one hand, like the article said, don't *preach* ham radio; make it *their* idea by offering it as a solution to a problem. In the end, it might take nothing short of an actual disaster to get most people thinking about preparing for one. And staging one would probably require a higher power.

Dear Annette:

Can I run my coax through my cold air return ductwork in my house? That would simplify my coax wiring by a long ways. Thanks!

Stan in Alpine

Dear Stan:

You can, but keep in mind that in most states, it's a violation of "the code" to run wires in housing ductwork, according to NEC (National Electric Code) 820.113 and NFPA (National Fire Protection Association) 90A 4.3.4.1 unless they're specifically installed for HVAC control. While these are not "law" per se, violating them could result in a denial of your claim, should your house catch fire.

Dear Annette:

Will an SWR meter protect my transceiver?

Harry in Provo

Dear Harry:

An SWR (standing wave ratio) meter can protect your transceiver pretty much the same way that a speedometer can protect your vehicle. While it does little to directly prevent damage, it's a visual indicator that can alert the operator, in case a safety limit has been reached or exceeded.

Dear Annette:

I have a Comet antenna that I've installed on my vehicle roof using an NMO mount, and it shows terrific SWR across both VHF and UHF. Because of the bend it's putting onto my car's metal, I decided to switch out the regular NMO connector with a Breedlove 503 NMO mount, whose size helps prevent sheet metal flexing. This new mount requires ring terminals instead of the normal coax connection, and now my SWR is 2.3 to 3.0 for VHF, and 8.0 or higher for UHF. Could the ring connectors somehow be responsible for the higher SWR?

Andrew in South Jordan

Dear Andrew:

It's not necessarily the ring terminals that are raising your SWR, but more likely the wires connected to them. At CB frequencies (~27 MHz), for which the Breedlove 503 is designed, a couple of inches of wire should not present much of an impedance change, but at UHF frequencies (~440 MHz), you might need to keep the wires to under ½″ each, which could prove difficult. You might want to keep your original NMO mount, then reinforce your metal body with a section of sheet metal about the size of a pizza sheet tin.

Got a question for Dear Annette*? Email it to* ***uvarcshack@gmail.com*** *and include your town name. Sorry, no guarantees.*

THE AMATEUR

The Amateur in You, Part 1

What have you been pondering?

Asking for the impossible

Once in a while, I see a question similar to this exaggerated example:

> *I live in an apartment that doesn't allow any ham radio operation, and where I'm not permitted to install any kind of antenna. But I want to communicate with anybody anywhere on any band. How can I do that?*

You might laugh at this unlikely question, but I hear something like it a lot more these days than ever before. In other words, *How can I do the impossible?* At first, a number of rather snarky or smart-alecky answers might come to mind, but the person asking the question is quite serious, and earnestly wants a solution. Another thought is to nit-pick the words "permitted" or "install", yet we know what the person is truly asking, regardless how we might want to spin the meaning, at the pretense of requesting clarification.

The person wants to explore amateur radio, but has restrictions. The answer "that depends" is often given out of frustration, but rarely helps. So, what can we say that's helpful? Often, the person asking doesn't always know what he doesn't know, and might look to you for ideas. Here are a few suggestions you might consider offering:

- Get a mobile radio, a mag-mount antenna, and a cookie sheet. Attach it to a filing cabinet or your fridge, and try getting on local repeaters, or at least listen to them. Monitor the *National Simplex frequency* in case somebody needs your help.
- If your antenna prohibition is due to HOA or personal rules against an unsightly antenna, you can try mounting an antenna on a flagpole or an old dish mount. Or get an *HOA Buster*, which takes advantage of your house's rain downspout (not good for houses with aluminum siding.)
- Use the *Web SDR* to listen to other amateurs around the world.
- MFJ does happen to make an "apartment-friendly" antenna built just for those who have an outdoor-exposed balcony railing or similar, the *MFJ-1622* HF Apartment Dweller Antenna. Simply clamp it to your railing, let the counterpoise wire hang down, and operate from 40 meters to 2 meters. When you're finished operating, simply roll up the wire, un-clamp the antenna, and within five minutes it looks like you were never on the radio. If you don't have a balcony, you can clamp it to a fixture, such as a desk, table, or bookshelf. I've used this antenna, and it's far from ideal, and requires some adjusting, but it's better than nothing.
- Do things that don't require operating a radio, such as helping with event setup, club organization, teaching classes, serving an exam session, writing articles, installing antennas, making presentations, and building antennas or other gear. That might not answer the original *How can I*, but it can still make you a useful part of the hobby.
- Try operating away from home by going portable or mobile, or using a station at somebody else's house. Even an HT in your vehicle can be a lot of fun, especially with an antenna out on your roof.
- If you anticipate moving your home in the near future, try checking out locations that might be a little easier on you ham-wise.

So, bottom line is, in most cases all is not lost. There are still ways to enjoy ham radio, even within your restrictions.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

THE AMATEUR

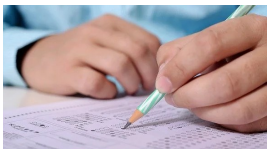
The Amateur in You, Part 2

What have you been pondering?

Ham radio for enquiring minds

Have you ever been on a road trip somewhere away from cell service, then thought, ***What would I do if I got stuck out here?*** By experience, you know that walkie-talkies and even CB radio allows you to communicate with your traveling party, but to reach out for help more than a few miles requires a different kind of communication medium, and a satellite phone might be just a little out of your budget.

Ham radio is a nickname for ***amateur radio***, "amateur" because it's not commercial, military, or professional. To legally operate a ham radio requires a license, which requires the passing of an exam that's not very difficult, but does require a little studying. You'll be tested on the rules, operating procedure, general radio theory, and some minor troubleshooting.



Anybody in the US who can pass the exam can hold a ham radio license, regardless of age. Even candidates who are disabled, elderly, or very young can have the exam questions read to them. To make studying easier without having to memorize everything for the exam, start at *HamStudy.org*. After you pass the exam, purchase a radio, practice getting on the air to become acquainted with it, then store it in your go-kit if you want.

Well, if you ***did*** have a ham radio handy, and you needed help, whom will you call? Most people you know, such as friends, relatives, or even police dispatch don't monitor ham radio frequencies, so you won't be calling ***them***. But it ***is*** possible that licensed amateurs are casually listening on ***their*** radios while being engaged in other activities, and they might hear you call out for assistance, even if it's not urgent. Once you get their attention, you can then ask them to call for help in your behalf.

But ham radio doesn't have to be all serious and emergency preparedness either. Many people get into in the hobby of ham radio as a fun and socially engaging pastime. While driving around or sitting in the comfort of their homes, some simply announce that they're listening, or just leave their radios on while they watch TV or work on a project. Then, when an old friend or a new ham announces his or her presence, the two can start up a conversation. And if a third person wants to join the conversation, it'll turn into a three-way party line of sorts.

Furthermore, many use ham radio to engage in the thrill of talking with people around the globe, in far away lands, just for fun. Some do it to contact as many countries as they can, while others try and find how far away they can reach somebody, and yet others do it to test their equipment for long-distance.

So, how can ***you*** get involved with ham radio, or at least learn a little more? Start by visiting noji.com/abouthamand then reach out to a local ham radio club. If you live in Utah County, contact the ***Utah Valley Amateur Radio Club*** at uvarcinfo@gmail.com

Hot Tips

Good info for the new ham, and old stuff to refresh your memory

How to route coax into your home

Most of us are interested in being able to hear others the best we can, while enabling others to hear us just as well. To achieve this, many have installed an antenna outside, typically up on the roof. Although this kind of antenna arrangement is almost ideal for most local amateur work, we tend to find that the most difficult part of the installation is the routing of the coax (coaxial cable) from our outdoor antennas to our indoor radio rooms.

So, what are your options? It's assumed that you've already decided where in your home to install your radio. Getting the coax from the outside to the inside often requires creative routing, but the focus here is on the actual entry, often involving drilling through a wall. Let's explore a few methods.

Through the roof

Once you install your antenna on the roof, there are a few convenient ways to bring your coax into your house without snaking the coax across your siding, gutter, eave, or downspout. The three most common ways to route your coax into the house from the roof are through an attic vent, a static (no fan) roof vent, or a sewer vent boot.

For an attic vent, slip the coax behind the attic vent grill and into the attic. You might need to drill a hole through the plywood frame or cut a hole in the screen, or both. Once you install the coax, be sure to add a drip loop to the coax, to prevent rainwater from following the cable inside. A roof vent is common on many larger houses, and you can cut the screen under the vent and slip the coax through it to the inside. Whether your coax is going through the attic vent or roof vent, be sure to seal the hole afterwards against bugs, using a small screen patch and roof sealant.

Static roof vents

A sewer vent pipe provides ventilation for each drain in the house, and protrudes through the roof by a boot. Drill a hole in the boot, and slip the coax through the hole, then seal the hole with weatherproofing roof sealant.

Once you route the coax into the attic, secure it to the trusses (rafters) instead of allowing it to drape or hang. Keep it away from walkways, where repair folks might walk on or into it. Afterwards, you can run the coax down a wall to your destination, or into the closet nearest your shack by way of a drilled ceiling hole.

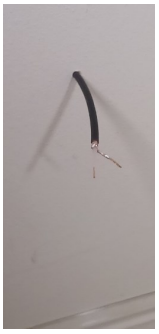
Through the wall

One of the simplest and yet least-conspicuous

Hot Tips

Continued

routing is drilling through your wall above your foundation or concrete footing. This means drilling a hole the size of your grommet, whose inside diameter is the size of your coax. Use a good stud finder to locate not only the wall studs, but the electrical wiring.



Once you identify where the hole should go, drill the hole completely through the wall, *from the inside to the outside*. If your exterior wall has stucco, drill a pilot hole from the outside first, using a masonry bit, then complete the drilling from the inside.

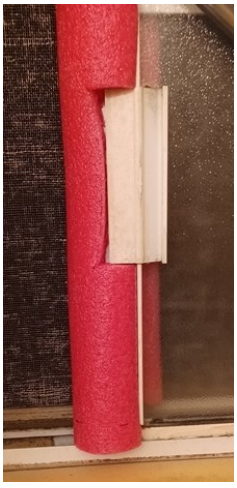
You'll be drilling through sheetrock, fiberglass insulation, plywood, foam insulation, then the exterior, which is likely aluminum siding. Pull the unfinished end of your coax through the grommet, through the wall, to the wall plate. Solder the coax to the SO-239 bulkhead, then bolt the bulkhead onto the wall plate. Secure the plate to the interior wall and the grommet to the exterior wall, and it'll appear clean and professional.

If you want, you can drill a hole through your wall large enough to slip a section of PVC pipe into it. This will allow you to add, remove, or change the coax that you put through your wall. Inside or outside, you can cover the pipe ends with a small, plastic junction box to seal out weather, bugs, and small, curious fingers.

Another way to go through your wall is through your foundation or concrete footing. This requires drilling through several inches, sometimes a foot or more, of concrete by a hammer drill and a concrete bit, especially a bit that can handle rebar.

Through the window

A (bedroom, den, office, dining room, or sliding glass) window also provides a convenient location to route your coax into your home from the outside. One way to make use of a window this way is to use a *pass-through*, of which there are several types. The standard pass-through is one that requires your window to close on the device, and is size-customizable.



Complete instructions on how to construct a pool-noodle pass-through for a

Hot Tips

Continued

temporary coax installation and routing are available. You can also purchase a ready-made flat pass-through, which are made to go under or around windows.

Through the floor

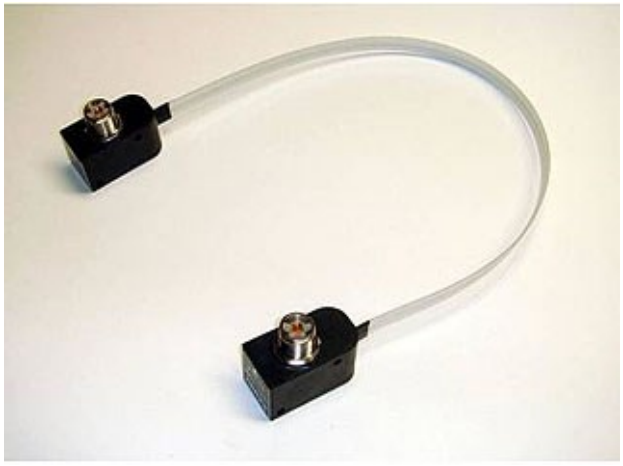
If your house has a crawlspace or an unfinished basement, you can often route your coax from under your floor. This doesn't mean you should simply drill a hole in your floor, although you can definitely do that, if you find that's more convenient. But I recommend routing the coax under the floor, then up the wall a few inches between studs, where you can install a wall plate as described above.

Some have found that coming from down below works better for them where they have installed an antenna apart from their houses, like on a tower or a shed. In those cases, they might want to run the coax through a buried PVC pipe. Some use *direct-burial* coax, which is meant to come in direct contact with dirt without damaging the jacket.

Beware

These precautions might save you a headache:

- Avoid making sharp bends in the coax; try to curve it around a corner instead.
- Don't lay or route the coax where it can get stepped on or snagged.
- Avoid pinching the coax by the edge of a door, window, furniture, or other means.
- Don't route coax inside heating and ventilation ductwork, sewer vent pipes, or dryer hoses, even if it's no longer being used for that purpose (code violation in the US).
- Don't cut any glass to route the coax through the window.
- Avoid placing any coax connectors in an underground pipe, if possible, even if they're silicone-wrapped or taped.
- Resist purchasing used coax, or coax that's more than six or seven years old.



Flat pass-through

Others

This list is by no means exhaustive; you can likely think of other good ways to bring coax into your house. Keep in mind that ***safety is your highest priority***, with appearance at a distant second place, but still important if you want to keep your spouse happy with your amateur radio home entry solution.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

DIY

Worthwhile projects you can build on your own

The 2-meter Hentenna

Ever on the lookout for a different gain antenna (one that exhibits greater than unity gain) design that works, I ran across this one called the *hentenna*, made by three Japanese hams for 6 meters. Another ham, WAØITP, re-made the hentenna for 2 meters, and came up with a workable alternative. The name "hentenna" is a play on words, in that the term "hen" is the Japanese word for *strange* or *weird*. It's probably not odd enough to be a good candidate for the ugly antenna contest, but it does look different from most 2-meter antennas.

Its construction is fairly simple, consisting only of a few pieces of copper tubing, associated copper joints, a coaxial cable connector, and a stiff wire. The only challenge to building this antenna is the soldering of the copper joints, which does tend to scare away some well-meaning do-it-yourselfers. Let's see what it's going to take, for us to build one.

The solder kit listed here contains the appropriate propane torch, copper pipe solder, the flux, and the flux brush, all necessary for this project, and yet just enough for a small project like this one. Of course, it can be replaced by the same items that you might already have.

Parts list

10 feet of ½″ copper pipe

Two ½″ copper caps

One copper solder propane torch kit

6 inches of 12 AWG solid copper wire

Two ½″ copper tees

Four ½″ copper elbows

One SO-239 bulkhead connector

One each M3 1″ screw, split washer, nut

One pipe cutter and some sandpaper will be useful tools. Steel wool is a good copper polisher.

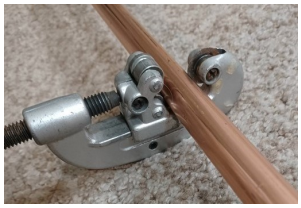
The construction

Cut four pairs of the ½″ copper pipe tubing to the following lengths:

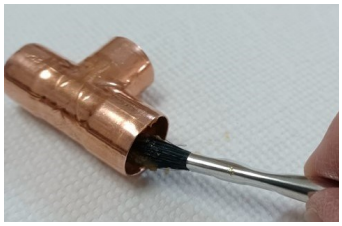
Two **31-13/16″** Two **11-1/2″** Two **6-1/16″** Two **5-3/8″**

If you haven't worked with copper pipe before,

1) use a pipe cutter to keep the tubing round
2) de-burr all cuts (with sandpaper)
3) polish the joining surfaces (with steel wool)
4) clean all joining surfaces (with a soft cloth)
5) apply flux to all joining surfaces



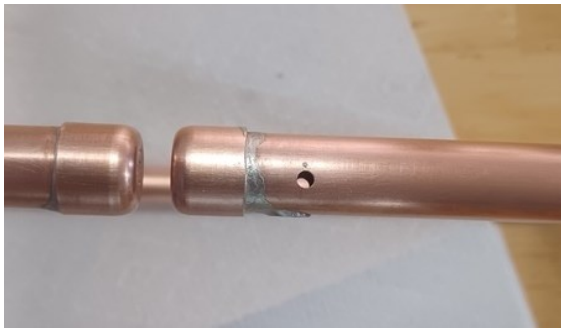
Let's call the two 5-3/8″ lengths the *driven elements*, since those are the pieces that we'll connect the coax to. Clean and polish about 1″ of each end of all tubes. Clean and polish about



DIY, continued

2-meter Hentenna

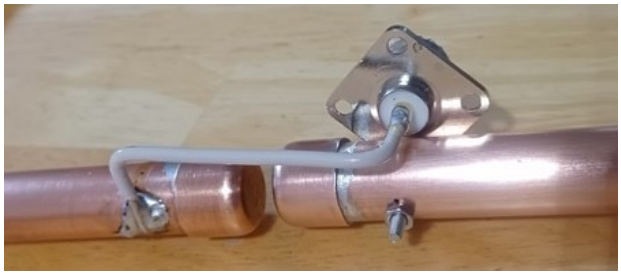
½″ inside the ends of the elbows, the tees, and the caps. Use the flux brush to smooth on a layer of flux over each cleaned surface, completely covering the join surfaces. Insert one of the 31-13/16″ tubes into one end of a tee, and one of the 6-1/16″ tubes into the other. Insert one of the driven elements into the middle tube of the same tee, and slip the cap onto the other end of each driven element. Repeat this for the other tee, finish assembling all the remaining copper pieces together, then solder-weld each joint. After the joints cool, scrub the solder with warm water (no soap), to remove the excess and burned flux.



Assembled and ready for soldering

Drill a 1/8″ hole into one of the driven elements, about 1″ from the cap end, and parallel with the antenna's long sides. Attach the SO-239 bulkhead connector by one of its four mounting holes to the driven element hole using the M3 screw, lock washer, and nut, then tighten.

Place an abandoned PL-259 connector onto the SO-239 bulkhead connector to help stabilize it while you're soldering, to prevent the Teflon dielectric from deforming due to melting. Strip and solder one end of a 3-1/2″ length of 12 AWG solid copper wire on the rear solder cup of the SO-239 bulkhead, and the other end on the driven element not connected to the bulkhead mounting flange.



You must use a high-wattage (like 100 watts) soldering iron or soldering gun, or the copper tube won't get hot enough to melt the solder, potentially creating a cold solder joint.

Once the antenna cools, remove the PL-259, scrub the new solder joints with water, and you've got yourself an antenna. Let's test it.

Testing the antenna

Two things to keep in mind when using the hentenna, both consequences of its high-coupling

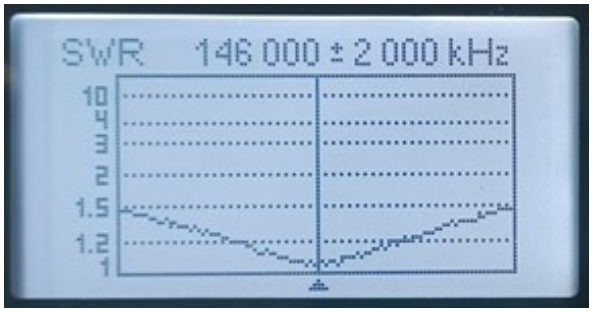
DIY, continued

2-meter Hentenna

design: it must be used on a non-metal mast and the coax must not run parallel to the driven element. Furthermore, the antenna requires at least ten feet of height over the dirt and anything metal. The orientation of the driven element and the two parallel antenna ends determine the signal polarization, so for vertical polarization, orient the three elements vertically.

The finished product

To properly test the hentenna, I mounted a 3D-printed tripod base (made by Eric Hansen N9ERC) and inserted three fiberglass military poles for legs. I zip-tied the antenna onto another fiberglass military pole, connected the coax, zip-tied the coax to the side of the antenna, and began testing. At first, with my analyzer connected by coax to the antenna, I was very encouraged by the promising reading.



Then came the hard test. I connected a pigtail to the coax, to adapt it to my HT, called out for a signal report, and heard nothing, not even the repeater acknowledgement. A little troubleshooting revealed a bad pigtail, which I had recently purchased. So, I got a known-good pigtail, got back on the radio, and right away Jeremy K7TEH gave me a wonderful report through the 146.760 repeater. I got another report from another ham through the 146.780 repeater, and ran out of time to test on simplex. Guess I'll leave that for another day.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)

Living in the Past

Historical perspective

The father of radio

While radio has had many "fathers" and inventors and other pioneers, perhaps the title *Father of Radio* is more appropriately associated with Guglielmo Marconi than with any other person. On 12 December 1901, Marconi received the first wireless radio signal in St. John's, Newfoundland, transmitted by a close colleague from a station he set up in Poldhu, Cornwall, England. He was 27.

At the young age of 18, having only been home-schooled and tutored (so having never attended high school or college), Guglielmo became fascinated by the works and findings of Heinrich Hertz, the first to demonstrate the radio waves predicted by James Maxwell. He was especially drawn to the possibility of communicating by telegraph over radio waves, dismissed by many as a scientific phenomenon rather than something for communication value. By age 20, Marconi was conducting experiments in his attic, and demonstrated to his mother a transmitter that, when he pushed a button, rang a bell attached to a receiver on the other side of the room. Once he saw this, Guglielmo's father began encouraging the young man to pursue his experimentation more vigorously.

The thought at the time was that radio waves were limited to a maximum travel of a half-mile, but when Marconi raised his antenna, he began to exceed that distance by two miles. Furthermore, he found that when he grounded his station and antenna, the distance increased even more. After failing to receive funding in his home country of Italy, Marconi traveled to England, where he met officials who encouraged him to patent his apparatus. On 02 June 1986, Guglielmo Marconi received the first patent for a radio wave-based communication system.

In England, Marconi took his system outside, where he was able to reach distances of 6 km, 16 km, and even farther. In December 1898, the British government approved the establishment of a wireless communication system aboard the *East Goodwin* and at the Dover lighthouse. In March 1899, the *East Goodwin* sent the first-ever wireless distress call in behalf of a merchant vessel, which had run aground.

Further encouraged by his successes, Marconi first attempted to span the Bristol Channel, then the English Channel, and eventually the Atlantic Ocean. Although his first transatlantic transmission was a little controversial, his subsequent experiments validated his claims.

Marconi never revealed the frequency he first used, but based on his equipment and antenna, we estimate his transmission frequency was between 820 kHz to 850 kHz.

Side of Bacon

A little ham humor

THINGS I DO IN MY SPARE TIME
USE MY HAM RADIO
LOOK AT HAM RADIOS
RESEARCH HAM RADIOS
I LOVE MY HAM RADIO
TALK ABOUT HAM RADIOS
THINK ABOUT HAM RADIOS
DREAM ABOUT HAM RADIOS

For Your Insight

Information you could use

Club meeting format

Here's the usual agenda for club meetings, at the Orem City Council Chamber Room, 56 N State St:

Talk-in frequency on the club repeaters

6:30 pm : Eyeball QSO

socialize / put faces with call signs

radio programmers available to help you

6:45 pm : Call the meeting to order

meeting lineup (agenda)

announcements / calendar / new hams

7:00 pm : Discussion / presentation

7:45 pm : Door prizes

7:55 pm : Dismiss and disassemble

8:00 pm : *Club QSY* to a local eatery

Something you'd like to see at the meetings?

Thanks to Heath Stevenson for making our monthly meetings possible!

Monthly meeting help

We're grateful for the volunteers who help with various tasks that make our club night just that much more friendly and useful to everybody. Monthly, we need help with

programming radios (thanks, Loren / Ralph!)

taking photos or videos during the meeting (thanks, Joe!)

setting up tables and chairs (thanks, Heath!)

Lynx

Websites for your education and leisure

Ham Radio Equipment
Ham Radio Nets
Radio Programming
Complete ham radio education
Net Training Topics
76ers Group and UVARC Group pages
New Ham Page

*Send your input to **uvarcshack@gmail.com***

Test your knowledge

General and Extra review (answers next page)

G3A11 : How long does it take charged particles from coronal mas ejections to affect radio propagation on Earth?

A. 28 days
B. 14 days
C. 4 to 8 minutes
D. 20 to 40 hours

E8BØ1 : What is the modulation index of an FM signal?

A. The ratio of frequency deviation to modulating signal frequency
B. The ratio of modulating signal amplitude to frequency deviation
C. The type of modulation used by the transmitter
D. The bandwidth of the transmitted signal divided by the modulated signal frequency

Calendar

What's happening
(times are Mountain Time)

Provo Ham Exam Sessions

Provo Fire Station #2, 2737 N Canyon Rd

Sign up at HamStudy.org/sessions

Wed 21 Jun, 7:00 to 8:30 pm

Wed 19 Jul, 7:00 to 8:30 pm

Wed 16 Aug, 7:00 to 8:30 pm

Sat 16 Sep, 2:30 to 5:00 pm

Wed 20 Sep, 7:00 to 8:30 pm

*Email **uvhamtest@gmail.com** for info*

Provo One-day Technician Courses*

Third Saturday Monthly at 8:00 am

Provo Fire Station #2, 2737 N Canyon Rd

** September through April*

2023 Orem Ham Radio Courses

Sign up at psclass.orem.org

Extra: Jul 18, 25, Aug 1, 8, 15

Technician : Sep 19, 26, Oct 3, 10

Club Meeting Calendar (6:30 pm)

On YouTube Live, and Facebook Live

June 1	July 13 †
August 3	September 7
October 5	November 2 *
December 7*	January 4

† *Ham Radio Fair, Pheasant Brook Park*

* *At the Orem Friendship Center*

Regular Nets

UVARC Family Net, Sun 3:30 pm, 146.780

NE UC ERC Net, Sun 9:00 pm, 147.540 (s)

UVARC Ladies' Net, Tue 7 pm, 146.780

DMR Utah Net, Wed 6 pm, TG 3149, CC 1

Utah 76'ers, Wed 7 pm, 146.760

UVARC HF Net, Wed 9 pm, 28.345 / 7.220

UVARC New Ham Net, Thu 7 pm, 146.780

CERT Ham Net, 2nd, 4th Thu 8:pm, 146.780

Utah County 6-meter Net, Fri 8 pm, 50.140

Family History Net, Sat 8 pm, 146.780

See a larger list of nets at noji.com/nets

Upcoming Contests

ARRL International Digital Contest

Noon Sat Jun 3 to 6 pm Sun Jun 4

ARRL Kids Day

Noon to 6 pm Sat Jun 17

ARRL Field Day

Noon Sat Jun 24 to noon Sun Jun 25

IARU HF World Championship

6 am Sat Jul 8 to 6 am Sun Jul 9

See a larger list at contestcalendar.com

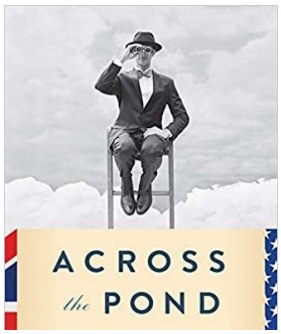
Answers to *Test your knowledge*

G3A11 : **D** (20 to 40 hours)

E8BØ1 : **A** (The ratio of the frequency deviation to modulating signal frequency)

Across the Pond

That is, the Utah Lake 'pond'



Eagle Mountain ham radio activities

This is a list of amateur radio activities that are organized near Eagle Mountain, primarily by Dave Becar KI6OSS. Unless otherwise noted, all these activities will be held at the Eagle Mountain City Hall, 1650 Stagecoach Run. Please contact Dave at **ki6oss6365@gmail.com** to register for any of the classes or exams, for any additional information, or questions in general.

Ham Radio Exam Session

Sat 03 June 10 am

Open to all, for any license class

August 2023 Technician Course

Thu 03 August, 7 to 9 pm
Wed 09 August, 7 to 9 pm
Thu 17 August, 7 to 9 pm
Thu 24 August, 7 to 9 pm
Thu 31 August, 7 to 9 pm

Ham Radio Exam Session

Sat 02 September, 10 am

Open to all, for any license class

Hands-on class

Thu 07 September, 7 to 8 pm

October 2023 Technician Course

Thu 05 October, 7 to 9 pm
Wed 11 October, 7 to 9 pm
Thu 19 October, 7 to 9 pm
Thu 26 October, 7 to 9 pm
Thu 02 November, 7 to 9 pm

Ham Radio Exam Session

Sat 04 November, 10 am

Open to all, for any license class

Ham Radio Nets

Eagle Mountain ECT Net

Sundays, 9 pm 145.230- MHz (131.8 Hz)

Eagle Mountain Chimney Rock Stake

Sundays 8:30 pm 446.500 (s)

Eagle Mountain Central Stake

Saturday 8 pm 145.650 (s)

Vendors

For your convenience

Pockrus Joystick J-pole

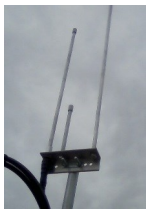
$30, open-stub aluminum half-wave, dual-band J-pole antenna

$40, 6-meter dipole, $20 for the 220 MHz (1.25 m) antenna

by Carl Pockrus, WE7OMG (email omgantennas@gmail.com to order)

Half-wave performance, solid construction, weather-proof, low wind-load

Probably the best-performing outdoor antenna you can get for the price



Super-Elastic Signal Stick

$20, vertical quarter-wave flexible antenna

by Richard Bateman, KD7BBC, of *SignalStuff* (and maker of *HamStudy*)

Super-performing antenna for your HT (handhold transceiver)

Visit SignalStuff and select SMA-Male, SMA-Female, or BNC

Ham Radio Podcasts v1.50

by Trevor Holyoak, AG7GX (email android@holyoak.com)

Stream podcasts (such as *100 Watts and a Wire*, *Amateur Radio Newsline*, *ARRL Audio News*, etc.) or download for later listening

For Android 4.1 and up (ad-free available for purchase)

Club Logo and Call Sign Embroidering

Want your call sign or name (or both!) embroidered on your shirt, your hoodie, your duffle? Or how about a club patch with your call sign?

by Glenna Gardner, WE7SEW (glenna0354@gmail.com or text 801-592-2503)

Call sign or name = $5, Both = $8, UVARC patch = $5, Patch with call = $9

Portable Aluminum J-pole

$60, sectioned, open-stub aluminum half-wave, dual-band J-pole antenna

by Stan, KJ7BDV and Kent, N7EKF (email skantenna@yahoo.com for info or call 801-372-7260)

Complete antenna breaks down into a compact 2″ x 6″ x 12″ package weighing only 3 lbs, perfect for backpacking and portable work where you really need a good 2-meter antenna

HamBadgers

Amateur radio name badges and other products

$10, official UVARC ham radio name badge with the club logo

Visit Ham Badgers and select Ham Radio Clubs > Utah Valley Amateur Radio Club

Email Eric Palmatier at hambadgers@gmail.com or call 919-249-8704

Where everybody knows your call sign

Utah Valley Amateur Radio Club
PO Box 1288

K7UVA
Phone/Text: 801-38-1865
Email: k7uva@arrl.net

Repeaters: 146.780–, 100.0
448.200–, 100.0 224.560–, 100.0
145.250-, 100.0 448.225-, 100.0
Newsletter input?
Email uvarcshack@gmail.com
Need help?
Email uvarcelmer@gmail.com

[See all our newsletters on uvarc.club]

We are the *Utah Valley Amateur Radio Club*, a 501(c)(3) non-profit (EIN 81-360-6416) Utah corporation that was organized in an obscure Orem fire station on 02-05-2016 to provide amateur radio enthusiasts in Utah County and surrounding areas a way to gather and discuss all things ham. Our primary purposes are to provide a local amateur radio resource, help new hams in their new-found adventures, and to give more experienced hams a reason to share their wealth of knowledge and wisdom in a friendly atmosphere of fellowship. We're an ARRL Affiliate and work in cooperation with the Utah VHF Society, but are not subsidiary to them, to ARRL, ARES, or any other organization, although many of our members and leaders might also belong to the same.

This newsletter is copyrighted and published by the Utah Valley Amateur Radio Club, and its purpose is to convey the tone and temperament of the club, to inform and entertain its members, and to entice the rest. To join, go to uvarc.club/join, then sign up at www.facebook.com/groups/uvarc/ to stay informed. For more information about our club or about amateur (ham) radio in general, please email or text or call us.

More than just a club, we invite you to become part of a great ham radio movement in Utah Valley

Our fearless leadership

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Vice President..... Chad Buttars
Secretary.....Caryn Alarcon
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Heath Stevenson, KK7KOU
Orem City Emergency Manager

From all of us to you, 73